Office of Foreign Disaster Assistance Evaluation of Africare Emergency Water Relief Regional Project: Zimbabwe, Malawi, Zambia July 16 -- August 7, 1993

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By

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Table of Contents

ANNEXES

EXECUTIVE SUMMARY

A. Introduction

The Office of Foreign Disaster Assistance (OFDA) strategy was to provide emergency water supplies to about 260,000 inhabitants of drought-stricken rural communities in selected southern provinces of Zimbabwe, Malawi, and Zambia. It succeeded in reaching the targeted population with emergency water. The activity was proposed and implemented by the U.S. private voluntary organization, Africare, which applied a regional approach that resulted in the rehabilitation of 934 wells and boreholes. OFDA's Disaster Response Division funded the activity through a grant of $1,502,959. Africare implemented the activity through its country offices, each of which assigned a full-time country drought coordinator. Field officers and water rehabilitation teams hired locally performed the day-to-day work of rehabilitating water points.

The purpose of the evaluation, which took place from July 16 to August 7, 1993, was to determine if Africare's regional emergency relief efforts in each of the three countries have fulfilled the immediate water requirements of the targeted populations. Focusing on the technical-organizational and management-organizational aspects of the program, the evaluation relied on interviews, direct observation, and review of existing documents. Direct observation at water points was emphasized in collecting data on construction methods and quality; focus group and key informant interviews were held with end-users, and district and health officials.

Program success was judged in terms of several criteria or indicators, some of which are:

- the water reached the people in a timely manner
- people were not forced to migrate in order to meet their water needs
- people did not die as a consequence of not having accessible, uncontaminated water
- rehabilitation of water points, including environmental health conditions, was of an acceptable standard
- social and economic costs were "reasonable"
- communities participated in the relief work
- emergency relief was designed and delivered unencumbered by non-emergency considerations, such as bureaucratic delays

B. Findings

The regional approach to emergency water relief worked successfully, both organizationally and technically. The beneficiaries would simply not have been served had this program not been implemented. Africare's alignment of its effort with national, provincial, and local bodies throughout the region resulted in an efficient and rapid delivery of services. The rehabilitation of existing water points proved to be a rapid, low-cost way to supply additional water to drought-affected populations in the target areas. Community involvement proved instrumental to the achievement of the emergency program goals in both Malawi and Zambia, though less so in Zimbabwe.

Management-Organization Findings For purposes of the water emergency relief initiative, relations between the three Missions and the relief activity were not satisfactory. This is due partly to Missions' perceptions that the initiative was an A.I.D./Washington and Africare idea that did not have sufficient input from the Missions and would take place with or without their concurrence. Furthermore, these Missions were already heavily involved in the food relief side of disaster response

and therefore had neither staff nor expertise to handle a water relief program. Two of the USAID Missions indicated they felt other, non-U.S., organizations had a "comparative advantage" in the water sector compared to U.S.-based non-governmental organizations such as Africare. However, the evaluators found no evidence that the program replaced or supplanted programs by other NGOs or by host governments that would have met the needs addressed by the program.

For at least two reasons A.I.D./Washington divided Africare's proposed activity into "relief" and "development" components. One reason was the purported lack of sufficient funding in a single source and thus the need to locate funds in two bureaus. Another, uncovered in a review of a draft of this report, was the conviction on the part of the Africa Bureau that certain activities proposed were, indeed, more "development" than relief in nature. The distinction made between the two was that the relief component rehabilitated existing water points, and the development component created new sources. As far as the evaluators could see, however, the aim of both activities was, in reality, to provide potable water on an emergency basis to drought-stricken populations. This division into relief and development activities thus became, in the eyes of the evaluators and most of the actors interviewed, an artificial distinction that complicated Africare's management and implementation of the relief effort, since each component had the same deadline. Furthermore, for reporting purposes, the distinction was confusing to the Missions.

Because of delays in negotiating and funding the program, timing of the work was delayed. Rehabilitation consequently commenced just as new rains were occurring, creating impassible roads and difficulty in dewatering wells. In spite of above-average rains in many of the affected areas, groundwater supplies had not recovered, making the delayed emergency water provision still critical.

Technical-Organizational Findings. Another ill-defined area was the definition of water relief, especially in view of the relief/development split mentioned above. Africare staff in Zimbabwe, for example, interpreted their mandate of rehabilitation as the restoration of wells -- mostly completed in the pre-independence era though with little attention to standards -- to production of water, without necessarily improving well protection. In some cases this method left open the possibility of contamination of the well by surface water carrying animal wastes. This situation is due also to the fact that the program did not address the general issue of water quality in any substantive way. Even in an emergency, the water provided must be potable or improvements in health will not be realized; in extreme cases health conditions may even be worsened. Thus, water quality must be assured by protecting the source or treating the water and by chlorinating water points when construction is finished and verifying chlorination by testing the water.

Staffing and equipment levels as initially proposed by Africare were inadequate in Zimbabwe and to a lesser extent in Malawi. This constrained speedy and efficient implementation of the program, although the efforts and dedication of Africare's teams minimized the impact of the problem. By assigning a drought relief coordinator to Zimbabwe who had little experience or training in the water sector and without ensuring the full availability of a technician with that expertise, Africare risked compromising program effectiveness.

C. Recommendations

Recommendations include the following:

- Improve environmental hygiene around the water points, particularly in Zimbabwe.
- NGOs intending to implement emergency water activities should have in-house expertise in the subject.
- Program activities should be extended to cover other areas of need and provide health education and other development activities that would further enhance the quality of life of the beneficiaries.
- In an emergency, delays of a bureaucratic nature should be avoided; furthermore, splitting an emergency water relief proposal into relief and development components simply because of funding constraints only hampers the implementation of such relief.
- Mission approval for all programs to be implemented in a country should be obtained. Responsibility for program oversight by the Mission must be clear. Relief activities should be defined and implemented as such, and can include construction of new water points.
- Further examination of the linkage between "relief" and "development" should be done, both through additional evaluations and specific case studies designed to "test" that linkage and to develop criteria to determine areas of congruity.

The water relief program would be ideal for a follow-on activity which would allow continuation of water point rehabilitation. Unmet water needs in the target areas and beyond could be satisfied. Further, completed activities could be greatly enhanced by additional, developmentally-directed activities, such as health education, intended to provide further improvements in sustainability and in the quality of life of the beneficiary population. Capacity building of local water agencies would also be appropriate, especially in Malawi and Zambia.

Follow-on activities, using and enhancing the village structures formed for water point maintenance, could build on health benefits resulting from the relief program by providing diarrhea prevention and oral rehydration training, improved methods of transporting and storing water, environmental hygiene, and other health topics. Such a follow-on is unlikely, given Missions' sentiments about the program from the beginning.

D. Lessons Learned

The evaluators extracted lessons learned in two domains: a) project design and b) broad actions. Project design lessons are as follows:

- Water specialists must be included throughout the cycle of emergency water relief activities, from design through implementation.
- A rolling plan for staff, equipment, and commodity levels must be used in emergency relief efforts where targets can not be fully ascertained at the outset.
- Health benefits to the beneficiaries cannot be expected unless the water provided is potable. Water cannot be assumed to be potable unless construction standards, including environmental hygiene, are defined and followed. Water quality cannot be determined except by analysis.
- Construction of new water points can provide emergency water supplies. Such construction, if intended as emergency relief, should be designed and managed as such.

- Community participation can be a highly effective approach in reducing costs and enhancing sustainability of emergency water activities.

Broad action implications are as follows:

- Timing is crucial in emergency relief response. Delays in funding and implementation can have a disproportionate effect on the rapidity of the response.
- Mission commitment is important to the effective implementation of a program, and oversight responsibility needs to be clearly stated.

I. INTRODUCTION

A. Purpose of Office of U.S. Foreign Disaster Assistance (OFDA) Strategy

OFDA's aim was to provide emergency water supplies to 260,00 people in drought-stricken rural communities in Zimbabwe, Malawi, and Zambia by rehabilitating 934 wells and boreholes. OFDA's support was part of a larger activity, shared with the A.I.D. Africa Bureau, to support the development of water resources in Southern Africa. Both efforts are a response to the 1991-1992 drought that hit ten countries in the Southern Africa Region. The combined activity was carried out by Africare, a Washington-based private voluntary organization (PVO), through two separate grant agreements: one was with OFDA, as described above, for a disaster response activity; the other was with Africa Bureau for a complementary, non-emergency activity to develop water resources. It is specifically OFDA's emergency water relief assistance that is the subject of this evaluation.

B. Constraints and Opportunities Addressed by OFDA Emergency Drought Relief Assistance

The major problem addressed by the drought emergency relief program was the lack of water supplies in hard-hit, drought-stricken rural areas of Zimbabwe, Malawi, and Zambia. Because of the drought, hundreds of thousands of rural inhabitants were deprived of potable water supplies. This response intended to rehabilitate existing water sources that had either dried up or were supplying inadequate quantities of potable water as a result of the drought.

Opportunities addressed by the activity were the development of a regional approach to emergency water relief and utilization of existing local community and government structures to carry out the emergency response. To the extent that these contribute to the provision of emergency water supplies safe for human consumption, each is assessed in this evaluation.

The scope of work proposed the following:

- in Zimbabwe, to deepen 300 wells, each serving about 150 people, in the six districts of Mutasa and Buhera North and South in Manicaland Province, Chivi in Masvingo Province, Mberengwa in Midlands Province and Kezi in Matabeleland South. It also was to include the training and equipping of ten water teams and the training, in the use and maintenance of wells, of community members designated by village water committees;

- in Malawi, in the districts of Chiadzulu, Thyolo and Machinga in the Southern province, to rehabilitate 44 boreholes serving at least 250 persons each, to rehabilitate 350 shallow wells serving about 600 persons per well, and to recruit and train 17 water technicians in well rehabilitation; and

- in Zambia, to rehabilitate 40 boreholes and 40 wells in each of the districts of Choma, Kalomo and Namwala in the Southern Province and to provide 15 water bladders to schools, clinics and food distribution centers, benefitting about 102,000 persons. Six water development teams were to be established.

Some of these targets were altered later as discussed in the body of the report.

C. General Technical and Organizational Approach

To eliminate constraints presented by the drought to the supply of potable water, variations of the regional approach were used by Africare for its OFDA activities in each of the three countries. Generally, on the technical side, the rehabilitation of water points included the repair, reconstruction, re-equipping or replacement of existing hand-dug wells, protected springs and boreholes. Organizationally, Africare implemented the activity through its country offices, each of which assigned a full-time country drought coordinator. Field officers and water rehabilitation teams hired by Africare did the day-to-day work of rehabilitating water points.

In meeting the opportunities, Africare worked through existing governmental structures. At the national level a drought or emergency water coordinating body, which included concerned Ministries, NGOs and other relevant agencies, set policy, fixed strategy and determined priorities. In Zimbabwe and Zambia, provincial governments and agencies implemented directives from the national body. At district level, to the extent possible in each country, Africare worked with authorities in selecting local sites. In some cases, communities participated in some of the rehabilitation activities.

With OFDA's approval, these targets were modified to reflect realities encountered by Africare in the field. These modifications and their implications are discussed later in this report.

II. EVALUATION PURPOSE AND METHODOLOGY

A. Rationale for the Evaluation

The purpose of the evaluation is to determine if Africare's regional emergency water relief efforts in the three countries have fulfilled the immediate water requirements of selected drought-stricken rural populations (see Statement of Work in Annex 1). It assesses the appropriateness and responsiveness of Africare's organizational and technical approach to a regional drought relief program. Furthermore, to the extent that the methodology allows, the evaluation analyzes such factors as the impact of the activity on social, economic, and health conditions of the affected populations, and its sustainability and cost effectiveness.

Findings of the evaluation for both Africare and A.I.D. are intended, where feasible, to help each make proposed adaptations in the short, remaining time of the effort. The evaluation intends to benefit OFDA in future efforts in emergency drought relief by providing "lessons learned." Therefore, one of the foci of this assessment is A.I.D.'s management organization of the activity. This includes A.I.D.'s response to the Africare proposal for an emergency water program, dividing the activity into OFDA and Africa Bureau portions by distinguishing between "relief" and "development", and overseeing the in-country activity.

B. Examination of Linkages among Variables

The evaluation attempts to examine the relationship among such variables as: malnutrition and the drought and poor health conditions and poor quality or limited quantity of water supplies; and clean water and improved health. Without proper controls to account for the influence of intervening variables, however, statements of causal association between the relief and changes in health status are inappropriate. Nevertheless, the evaluation does try to correlate the intervention to the before-and-after health status of the affected people.

C. Evaluation Methodology

Program success consists of provision of potable water to the target population in a timely manner. Indicators of success include as follows:

- the rapidity of the response
- target populations did not migrate in order to meet their water needs
- the health status of the target population was improved and mortality decreased
- water provided is of acceptable quality
- "reasonable" social and economic costs
- community participation
- sustainability
- effectiveness of program management
- use of appropriate approach and technologies
- design and delivery of emergency relief unencumbered by non-emergency considerations, such as bureaucratic delays.

Some of these indicators were not easy to quantify, since data were not easily available. Nevertheless, a serious effort was made, using the above indicators as a guide, to judge the effect of the intervention on post-relief conditions.

The evaluation used several rapid assessment methods and techniques, including interviewing, direct observation, and review and analysis of existing documents. These served as a source of information on the following: work completed, work in progress and work yet to be started at water point sites; practices, benefits, and problems experienced by water users; general conditions of use and of environmental hygiene at well points; and positive and negative effects on affected populations.

Initially a review of relevant available reports on the drought in each country was made. This was followed by briefings/interviews with OFDA, Africa Bureau, and Africare personnel in Washington. Next were interviews with U.S.A.I.D. officials and Africare in-country staff. These were followed by interviews with host country officials at national, regional and local levels. Examples of persons interviewed included: national drought coordination officials; regional and district administrators; district water officers; district, sub-district and community health officials and workers; village leaders and community members (see Annex 2 for individuals interviewed).

Considerable effort was made to interview end users. This meant that women of all ages who came to water points while the evaluators were present were interviewed. Occasionally a young man who came to haul water was questioned. And, finally, a few mid to old aged men who were on the community water committee were questioned about the community's role in well work.

Many health officials were also interviewed in order to attempt to untangle aspects of relationships among drought, health conditions, and water use practices and water quality. Although pinpointing the direction of causation in these complex relationships has not been resolved here, some insight into the problem is provided. Direct observation at water point sites was emphasized in collecting data on construction methods and quality, on user practices, and on the role of community participation.

The evaluation portion of this report (Chapter IV) relies on three distinct, yet related analytic concepts. These are efficiency, effectiveness, and impact. Efficiency questions address how well finance, commodities, personnel, implementation, and results (i.e., outputs) have been organized and managed. Effectiveness questions address if, and to what extent, the relief effort has achieved its intended results. Indicators of effectiveness are user behavior change, sustainability, cost effectiveness and institutional viability. Impact, which is usually understood as part of a longer-term perspective and, not typically a consideration of emergency relief programs, in this evaluation is used to address more immediate effects of the relief, such as altered health, social, economic, and environmental conditions.

D. Limitations of the Methodology

Observations of water points were limited by the number of sites visited. Sites were often scattered, difficult to reach and the time too short to allow the evaluators to visit more than a small proportion of the sites. To ensure as broad a sampling as possible, given the time constraints, the evaluators requested, in advance, visits to water-point sites reflecting different physical-environmental conditions, various stages of construction progress, certain differences in socio-economic conditions of water point users, and some not-so-successful or unsuccessful rehabilitations. They visited some sites which were remote or which were not arranged in advance by the Africare country drought coordinators or their technical field coordinators. While it is not easy to eliminate bias in selecting sites to visit, the evaluators felt that they were able to observe a reasonable sampling. Nevertheless, some bias may exist towards observation of the more successful rehabilitations.

III. ORGANIZATION OF THE REGIONAL DROUGHT RELIEF PROGRAM

A. General Context and Conditions

Africare's initial draft proposal contained a unitary approach to the drought, rather than what it became -- an effort split between OFDA, as an emergency drought relief project, and the A.I.D. Africa Bureau, as a water resources development project. The split was made at the request of U.S.A.I.D. in an attempt to share the burden of funding; under it, rehabilitation of water points was funded by OFDA and the construction of new water points as well as all work on dams was funded by the Africa Bureau. The effects of this split had different ramifications in the different countries, which will be discussed later in the report.

The grant agreement with Africare for emergency water relief was signed only at the end of September, 1992, while the first proposal had been presented by Africare in early May, 1992. It was only when it was asked to split the proposal into emergency and development parts that Africare had to re-submit several weeks later. This added to the start-up delay.

A second cause of delay was the timing of funding. Although, in July, 1992, A.I.D. sent Africare a pre-grant authorization letter for the program before the Project Implementation Order (PIO/T) was

issued, Africare felt it was unable advance start-up funding for the program. It estimated it would have expended up to a third of its unrestricted budget prior to the signing of the grant agreement, which it felt it could not afford. Africare had recruited two of the Drought Coordinators; even so, procurement and staffing in all three countries took several months. Consequently rehabilitation work did not start until November, 1992, nearly coincident with the start of rains that made logistics and water work difficult, causing a slow start-up. While the rains were the longed-for blessing, rivers swelled and roads became impassible, so that teams could not reach remote water points. Furthermore, dewatering wells became difficult and time consuming or even impossible.

Africare's regional approach to program organization was to work through national government drought coordination bodies, including emergency water coordination bodies, through regional or provincial authorities, and district officials, and through community councils and water sector committees. To date, Africare has held two regional conferences and workshops, which have provided an exchange of technical and organizational approaches used in the three countries. Host country government as well as Africare personnel attended the second conference.

In each of the countries visited, officials stressed the importance of foreign assistance and NGO involvement in the drought relief effort. They cited bureaucratic slowness, incapacity and lack of funding as limiting their government's ability to respond adequately to the crisis. They also unanimously praised Africare's emergency efforts. In no case did the evaluators find any evidence that Africare's program displaced or supplanted the efforts of local government or other NGOs; rather, the areas served by the program would not have received any relief directed at easing water shortages.

In all three countries political change was a factor in the relief effort. Zimbabwe was attempting to decentralize certain functions, including the operation and maintenance of water points, from national to regional or district levels. In Malawi, U.S.A.I.D., reacting in support of efforts to democratize that country's political system, had limited aid to the country. Zambia's new government had restructured the government and, while long-term improvements may result, funding and staffing of new Ministries such as Energy and Water Development (established in 1991) limited the support provided by the Government of the Republic of Zambia (GRZ) to Africare's program.

Field organization of Africare's operation included a Drought Relief Coordinator in each country to supervise working teams. Several teams in each country are headed by a logistics coordinator or water supervisor. Each water team is organized along lines of specialized positions; these will be detailed for each country in later sections. Equipment and personnel were often shared with the Africa Bureau-funded portion of the work.

The following sections describe the specific conditions of each U.S.A.I.D. Mission and host country government with which Africare worked. The order used is the order in which evaluators visited the countries.

B. Zimbabwe

1. U.S.A.I.D./Zimbabwe

U.S.A.I.D. has overseen the activity through a Foreign Service National assigned by the Mission as the control officer for water relief and development activities. U.S.A.I.D.'s country strategy has included food assistance in its response to the drought, namely in the form of a Title II request and Title I,

(416) allocation. The Mission strategy, however, does not include water relief or water development assistance. It indicated that it felt other donors had a comparative advantage in the water sector and initially, therefore, was not in favor of the activity. Nevertheless, it has supported Africare's activities to the extent that it is in its manageable interest to do so.

2. Government of Zimbabwe

The Government of Zimbabwe (GOZ) declared the drought an emergency in February 1992. In response to the crisis the GOZ charged the National Action Committee for Water and Sanitation (NAC) with coordinating strategies for meeting and alleviating the disaster in the water sector. Members of the NAC included ministries active in the water sector, including the committee's sponsor, the Ministry of Local Government, Rural and Urban Development (MLGRUD). The NAC coordinates and monitors the development of an Integrated Rural Water Supply and Sanitation Program. Its members include, among others: the District Development Fund (DDF); the Ministry of Community and Cooperative Development; Ministry of Health (MOH), which is responsible for the national program for preventive health care including environmental health and health education; and the Ministry of Energy, Water Resources and Development.

An Emergency Water Plan for the drought was prepared by the NAC and approved on 29 April 1992. In addition, an NAC Task Force, with members from the National Coordinating Unit (NCU), was made responsible for the day-to-day coordination of the national drought emergency.

Similar Task Forces were established at the provincial and district levels and included NGOs active in water resource development in those areas. Through this structure, priority areas were identified and GOZ, donor and NGO activities were coordinated and monitored nationwide. Information from the field also allowed quick response to changes in the local situation.

MLGRUD supported the drought response directly through its local arm, the District Development Fund (DDF). Although their limited resources significantly affect their efficiency, DDF is normally charged with, among other services, water point maintenance and new water point development. Africare has aligned itself with this structure, participating in the coordinating committees and using DDF technical personnel and resources to assist in the implementation of its field activities. Additional coordination at the district level involved Africare's participation with other NGOs and local counselors on the sub-committee of rural water and sanitation. The purpose of that body was to prioritize water-point site selection and allocate donor funds across a district.

Further cooperation between Africare and district administrations included provision of a field supervisor, paid by Africare, who supervised rehabilitation teams whose members were also paid by Africare. Some of the villages that received an improved well participated in a village-level water committee whose responsibility is to do light maintenance on the hand pump and keep the well area clean. In some cases communities also provided lodging and food as well as some materials and assistance for rehabilitation teams.

3. Africare

The drought relief activity funded by OFDA for Zimbabwe consisted of deepening 300 wells. These wells were located in the districts of Lupane and Bubi in the Province of Matabeleland North and the districts of Kezi, Gwanda and Filabusi in Matabeleland South province. These were chosen in

response to a specific GOZ request, replacing districts in other provinces designated in Africare's initial proposal. The shift of focus exclusively to these two provinces had a number of implications for the implementation of the program in Zimbabwe. The increased time and cost required for blasting to deepen wells in the hydrogeologic conditions of the new target areas resulted in a decrease in the target numbers of wells to 268. However, at the time of the evaluation, it appeared that the 268 wells will be deepened ahead of schedule and under budget, allowing Africare to continue its activities and complete the original number of 300 wells. It is also noted that the OFDA and U.S.A.I.D. programs for emergency water relief were distinct and separate in Zimbabwe, although some personnel and equipment have been transferred from one program to the other.

Africare's personnel included: a Drought Coordinator based in Harare; an Administrative Assistant, also based in Harare; two Logisticians, one for each of the Provinces; five Field Supervisors, one for each district; and 37 four-member rehabilitation teams, each headed by a blaster. The number of teams was increased from 25 to 37 to meet the schedule. Thus Africare has exceeded its target of establishing ten water teams in the districts. The Drought Coordinator and the Logisticians each had a four-wheel-drive pickup truck, Field Supervisors had bicycles, and teams were supplied in the field and moved from site to site by one six-ton truck, one four-ton truck, and two tractors equipped with trailers.

C. Malawi

1. U.S.A.I.D./Malawi

U.S.A.I.D./Malawi was involved from the beginning in national drought committee planning and coordination meetings. Its major response to the drought was food aid, and it played a significant role in supplying food to Malawi. The former U.S.A.I.D. drought coordinator told the evaluators that he had invited Africare to help support the food distribution effort, but Africare chose to place its focus on emergency water relief.

When the Mission reviewed Africare's proposal for emergency water relief, it thought the geographic scope too broad, the number of water points too large and the types of water points proposed too diverse and voiced concern about the availability of rigs to drill new boreholes. Further, U.S.A.I.D. felt that the proposed targets were coming out of Africare's home office with little input from Africare's Malawi country office. Both field and home offices of Africare purport that the field office was solely responsible for proposing targets, on the basis of their consultations with local authorities. U.S.A.I.D. also felt that technical inputs, including information on the location and number of water points to be serviced and populations to be served, were insufficient. U.S.A.I.D. proposed reducing the target numbers and areas, and Africare subsequently adjusted its proposal. U.S.A.I.D. still felt that the targets were very ambitious and that the equipment, personnel and funding were not adequate to accomplish the expected outputs.

U.S.A.I.D.'s former drought coordinator also indicated that Africare was not alone among NGOs whom he characterized as having "no experience [in water relief] behind them" which came to U.S.A.I.D. with proposals for drought relief. Accordingly, the former coordinator noted, since "we'll only know if the NGO can do the work by letting them do it", the decision to proceed was made with respect to Africare as well as some other NGOs. (Africare has vigorously disputed this characterization, indicating that it had substantial water experience in Malawi, including the Ntcheu protected springs and other water programs.) Given the Mission's perception, it was decided that its

criteria for judging performance would have to consist of how well the NGO, in this case Africare, was able to adapt its management process and organization to changing conditions of the drought in the field, rather than in meeting targets set forth in the proposal.

As in the case with Zimbabwe, Mission management in Malawi was convinced that non-U.S. NGOs such as Save the Children/U.K. (SCF) had a comparative advantage in water extraction. However, a valid comparison is difficult on both cost effectiveness and distribution grounds. For example, much of SCF's effort was directed to new, relatively expensive boreholes and borehole rehabilitations under different conditions in different areas. As mentioned earlier, however, need was so great that the Africare effort reached hard-hit populations that would not have been served by other NGOs or the government of Malawi (GOM).

2. Government of Malawi

At the beginning of the drought, the GOM Water and Health Committee set up a Water Task Force to provide planning for the drought. The Task Force gathered information on the need for water points in the districts and prioritized areas to receive relief. For each district, one NGO was assigned to coordinate emergency water relief, survey the district to provide updated, detailed information on water sources and needs, and monitor activities among all NGOs and GOM agencies working in the water sector for that district. Africare was designated the coordinating NGO in Chiradzulu District. The Congress of NGOs of Malawi (Congoma) set up the Drought Relief Coordination Unit (DRCU), of which Africare was a member, providing a forum for NGOs to share information, thereby avoiding bureaucratic and logistical confusion and duplication of activities.

Data provided by the Water Task Force to Africare for use in formulating its proposal to U.S.A.I.D. proved unreliable; drilling rigs and compressors that the Water Department promised Africare it could use were already programmed for use in other areas. The Water Department is badly understaffed and under-funded and was able to lend only minimum assistance to Africare in its field activities.

3. Africare

The drought relief activities proposed for funding by OFDA included the rehabilitation of 350 hand-dug shallow wells and the rehabilitation of 44 boreholes. However, when the program activities started in Malawi, Africare found that the GOM figures needed revision. Taking a "well" to be a water point that had at one time been at least partially protected, and including protected springs, field staff took an inventory of existing water points and found a combined total of only 255 boreholes, wells or protected springs to be rehabilitated in the target area. Some of the wells and protected springs were beyond repair and had to be replaced with new water points. In view of the survey results, and with Mission concurrence, the target number of water points to be rehabilitated was reduced to 255. As of mid-November 221 wells had been completed.

Africare's water relief efforts in Malawi were managed by an expatriate Drought Relief Coordinator, who directed both the work funded by OFDA and by the Africa Bureau. Because the work funded by the two, although separate, was in the same districts and often required the same type of materials, equipment, tools and labor, Africare found it expedient to manage the work as if it were a single program, with workers and equipment moving from a site funded by OFDA to one funded by the Africa Bureau or vice versa, as appropriate. To avoid confusion, an individual site was designated as OFDA or Africa Bureau work in accordance with the grant agreements.

Africare's main office in Blantyre, where the Drought Relief Coordinator was based, provided administrative and logistical assistance. From the start of the activity until April of 1993, the Coordinator was assisted by a local-hire Water Engineer, who helped train field staff and assure that work was done to GOM standards and was of good quality. In each of the three target districts, Africare had a Water Team Supervisor, responsible for day-to-day coordination and logistics. Each of the Water Team Supervisors was responsible for two to four Water Technicians, who supervised a team consisting of a builder and three laborers. Each team specializes in a particular type of work, such as borehole rehabilitation, shallow well construction/rehabilitation, or "tubewell" construction with hand-powered drilling rigs (Vonder rigs). Approximately 80 percent of the field personnel came from previous Africare projects; additional training for staff was provided in borehole rehabilitation, the operation of hand-powered "Vonder" drilling rigs, and other appropriate technology.

The Drought Relief Coordinator had a four-wheel drive pickup, and each of the Water Supervisors had a motorcycle. For transporting teams and materials, two of the districts had a driver with a tractor and trailer; and one had a six ton truck with driver.

D. Zambia

1. U.S.A.I.D./Zambia

U.S.A.I.D./Zambia was primarily occupied with the emergency food relief program during the drought, in effect managing that program for the Government of the Republic of Zambia (GRZ). U.S.A.I.D./Zambia was responsible for importing 122,000 tons of corn worth U.S. $79 million for delivery to the affected population. That represented 62 percent of the total donor food gift.

The Mission indicated it might have put more emphasis on water relief had it not been overextended by its critical role in coordinating food relief. Since Africare's water relief was a regional effort, the Mission did not become directly involved in the management of the activity. Although no U.S.A.I.D. official has yet had the opportunity to make a site visit to observe program implementation, it regularly receives and reviews copies of Africare's reports.

2. Government of Zambia

The national program for water relief in Zambia has not been as strong as in the other two countries. The Ministry of Energy and Water Development initiated the Drought Task Force for water relief, to be headed by UNICEF. That group determined which provinces were the hardest hit, then assigned the few NGOs capable of and interested in water relief to work with task forces established at the provincial and district levels. Since provincial budgets and resources are severely limited, most of the funding and other resources for water relief activities have come through donor-supported NGOs. Provincial and district authorities have in effect given over most responsibility for emergency water relief to a few NGOs.

Nevertheless, the Africare program has been implemented in close cooperation with GRZ agencies, elected councils, and tribal and village leaders. Information concerning water point site selection and administration flowed from communities and chiefdoms to newly formed ward councils and from there to provincial authorities. Africare, in collaboration with Water Department officials, used this data to establish priorities and select sites.

3. Africare

Africare's work in Zambia was facilitated by the pre-proposal identification of sites by its Country Director and Field Officer in cooperation with water affairs officials. In order to adjust to the late start of activities and to field conditions, the composition of water points to be rehabilitated was changed from 120 shallow wells and boreholes each to 60 shallow wells and 180 boreholes. This decision was made because shallow well rehabilitation is more time- and labor-intensive than borehole rehabilitation and more boreholes than shallow wells were found in the target area. Further, boreholes equipped with handpumps can serve more people -- an increase estimated at 100 to 200 beneficiaries per water point -- than rehabilitated wells equipped with windlasses and buckets.

In fact, Africare's Drought Coordinator's estimates that about 70 wells and 200 boreholes will be rehabilitated. The estimated number of beneficiaries is about 125,000 people, an increase over the 102,000 beneficiaries estimated in the proposal. However, rather than supplying 15 bladders for water storage in schools, health centers and food distribution points, Africare gave priority to the rehabilitation of water points at those places. Given that no provision was made in the program for trucking water to the bladders, and the vulnerability of bladders to vandalism and breakage, this decision was appropriate.

Because of the distance of the project area from Lusaka, where Africare's country Drought Coordinator is based, activities in each of the three districts were managed by a Water Engineer. The Engineers each supervised two Water Technicians, who, in turn, each supervised a construction team and a tractor driver. Teams consisted of a mason or well expert for shallow wells or a plumber for boreholes, with two to three assistants. As the teams gained experience, they were able to split up and one or two team members, with village assistance, could complete the rehabilitation of a water point.

Work was accomplished with limited equipment, although the program had more vehicles than in Malawi or Zimbabwe. The Drought Coordinator had a double cab pick-up, the Water Engineers each had four-wheel drive pick-ups, and each Water Technician had a motorcycle supplied by Africare. Additionally, each of the six teams was equipped with a tractor and a specially designed trailer made in Zimbabwe. Additional equipment included tools, dewatering pumps, and camping equipment. The equipment provided seemed adequate for efficient implementation of program activities, except that several of the Water Technicians interviewed mentioned that where blasting was necessary for well deepening, a power drill would have facilitated the work, lessening the time for drilling holes for placement of explosives. The equipment is being shared with the Africa Bureau-funded part of the work, and some of it was purchased using funds provided for that part of the work.

IV. PROGRAM EFFICIENCY, EFFECTIVENESS, AND IMPACT

A. Design and Management Organization Issues

1. General

It was the feeling of some U.S.A.I.D. Mission personnel and the evaluators that the levels of input in regards to staffing, equipment, and possibly funding were inadequate to the outputs expected, and that the proposal would have benefitted from the input of experienced water engineers. This is confirmed to some extent by the fact that in Zambia, where the Drought Coordinator was an engineer with

experience and training in water supply (unlike the other Drought Coordinators, who are nonetheless excellent and dedicated managers) the equipment and staffing levels provided under his leadership allowed more efficient implementation of the activity.

Little consideration was given in the design to the issue of water quality. While recognizing that the provision of a sufficient quantity of water of "reasonable" quality is better than the provision of an insufficient quantity of water of very good quality, the issue of water quality cannot be ignored even in an emergency. Provision for improving unacceptable hygienic conditions around wells should have been included in the project design, i.e., adequate protection of water points to prevent contamination from the seepage of surface animal waste or other sources should have been assured. Furthermore, without treatment and/or testing of the water sources, the potability of the water supplied should not be assumed. Simple field test kits for water quality analysis are available and provision should have been made for their purchase and use.

2. Zimbabwe

As mentioned earlier, the target areas for Africare's well-deepening program areas were changed to five districts in Matabeleland South and Matabeleland North, the two worst hit provinces in Zimbabwe. Africare consequently adjusted its target from 300 well deepenings to 268 and the number of construction teams was increased from 25 to 37. At the time of this evaluation, savings during construction of the wells completed to date and the extension accorded the program by OFDA may allow the proposed original target of 300 wells to be achieved.

The program was to be aligned with the GOZ administrative/service delivery structure responsible for delivering services to the rural populations of the country. Even under normal conditions, however, the structure is under-funded and would have been totally inadequate to relieve the drought conditions with GOZ inputs alone.

First, provincial and district government administrations and services did not have the financial resources to purchase emergency relief commodities, such as transport vehicles, pumps, and cement. Thus it would have lacked equipment and materials as well as the ability to move numerous teams, equipment and materials rapidly from one well site to the next. Second, neither provincial nor district government administrations had adequately trained staff to comprise the necessary number of teams and supervisors.
Africare's alignment of its program to the District Development Fund (DDF) technical unit under the District Administration proved very workable. This was a highly cooperative relationship built on the confidence of district authorities and DDF technicians in Africare's delivery of water. Africare could have done most of the well-deepening work without any relationship with the districts. However, its cooperation with the District Administration and village leadership in selecting sites and with DDF technical supervisors has assisted in organizing and implementing the work.

Less successful has been the engagement of communities in participation in the work and ownership of the results. The weakness of existing village water committees probably contributed to the poor organization of the communities to provide self-help labor. Also a result of this was that community members received no training in the proper use and maintenance of the wells. The grant agreement stipulated that Africare was to provide "overview" to this training, however, since the pumps used were a model common in the area, training may have been unnecessary.

The efficiency and effectiveness of Africare's country Drought Coordinator's and Logistics Officers' work was compromised by lack of experience in shallow well work (the Matabeleland South logistical officer is experienced in deepwell construction) and by the large area to be covered with very little staff and equipment. Lack of adequate transport meant that Logistics Officers often acted as transporters for men and materials. Even then, teams sometimes were delayed, waiting for materials, equipment, or transport. Also, although hired from drilling companies, the Logisticians had little experience in shallow well construction and were unable to provide suitable technical supervision for the rehabilitation work.

Further, because the Coordinator has both OFDA and U.S.A.I.D. water development responsibilities, he has been divided between two rather different and, worse, geographically distant areas of work. The OFDA-funded drought relief work alone would have occupied the Coordinator's time and effort. The same is true of the Logistics Officers, though to a lesser degree.

3. Malawi

Data used to establish proposed targets were supplied by the Government of Malawi (GOM) Water Task Force. As mentioned earlier, this data proved unreliable and needed to be updated; consequently targets set by the proposal had to be revised. While more accurate figures could perhaps have been provided in the original proposal, it is clear that there were large gaps in information and only as Africare carried out its survey of the districts' needs could the work plan be finalized.

As in the other countries, program activities were designed to be implemented in line with GOM structures, both permanent and those created to deal with the drought. Africare's alignment with GOM structures was extremely useful at the district level, where officials such as the Health Surveillance Assistant provided information and assistance to the program. However, the U.S. government's insistence that GOM receive no institution building or other aid directly benefitting the GOM, until they institute democratic reforms, constrained the effectiveness of this policy.

Like Zambia and Zimbabwe, GOM's Water Affairs Department lacked the staff, funding or equipment necessary to provide the needed water relief. GOM's Water Task Force assigned one NGO, active in each district, to be the coordinating agency for water relief for the district -- Africare was the coordinating NGO for Thyolo District.

4. Zambia

Africare's Zambia program, perhaps more than the other country programs, filled a gap left by provincial and district water authorities. Because of inadequate budget resources, these authorities -- at least in the Southern Province -- were unable to carry out much, if any, emergency water relief. Thus, Africare became a major player in providing water relief in that province.

Zambia's newly formed Ministry of Energy and Water Development was unable to meet the challenges offered by the drought. Although a Water Task Force coordinated by UNICEF was established, little priority was given to the sector. Nonetheless, working through existing and new government structures such as the Ministry and the newly formed ward councils assisted Africare in implementing the program and provided some capacity building to the GRZ. Its cooperation with water authorities and its open interaction with district councils, tribal authorities, and community

members have been effective both in completing the work efficiently and in enhancing the community "ownership" of water points.

Africare field teams in Zambia have been well staffed. Quality of training of the engineers and technicians is high and their production respectable. Coordination with dam site teams and efforts, the "development" component, has not been problematic, though the Drought Coordinator has had to juggle his time very carefully in coordinating the two, very different activities.

Overall implementation of the emergency effort by Africare in Zambia has gone well. In spite of the late startup, Africare expects to exceed its targets and has adapted them sensibly to provide faster relief to more inhabitants.

B. Technical/ Organizational Issues

1. General

Some issues are common to all the countries. During the procurement phase of the program, Toyota/South Africa, where vehicles would normally have been purchased, was on strike. Therefore, Nissan four-wheel-drive pick-ups were bought for Drought Coordinators, Water Engineers and Logisticians. The suspension on these vehicles has proved inadequate to the roads and loads imposed on them in all three countries.

In all three countries, as discussed earlier, delays in negotiating and funding the program in A.I.D./W also affected the timing of the work. Consequently, construction started at the beginning of the rainy season, when many roads are impassible and dewatering wells was difficult. The delays were the major reason Africare requested, and A.I.D. granted, a no-cost extension of several months to complete the program.

In spite of above-average rains in many areas, it appears that the groundwater supplies have not yet recovered and that assistance to the water sector in all three countries is still needed and timely. The availability of water supplies, especially potable water, although somewhat recovered, is still well below normal for the season and has been worsening as the dry season advances. Consequently although the drought is officially ended, many people in the target area are still experiencing the results of a water deficit, often walking long distances for water of questionable quality. Even with the late start of activities, the program has served an essential purpose.

Another point to consider is that the rains that arrived in late 1992 could not be guaranteed at the time the program was funded and implemented. Had the rains not started, the water situation would have worsened rapidly and significantly and the program taken on even more urgency.

2. Zimbabwe

The water points in question consisted of hand-dug wells, equipped with hand pumps, in which the yield had diminished to provide little or no water. Users were forced to seek alternate water sources, that were often far away, and/or unprotected and/or used by more people than could be served adequately. The lack of water in sufficient quality and quantity negatively affected the social, economic and especially health status of the population concerned. Well deepening provided additional storage for wells in which the water was harvested more quickly than the well could

recharge. The additional storage prevented the well from running out of water during times of peak use. Deepening could also be expected to reach deeper into the water table, thus increasing yield.

In implementing the well deepening program, Africare worked closely with the DDFs in each of its target districts. The DDF, which under normal conditions has provided water to rural populations, was able to provide warehouse space, additional supervision and other support to Africare.

a. Method of work

Water points for rehabilitation were selected by the National Coordinating Unit based on information gathered from officials of the DDFs in the districts as well as other concerned ministries and agencies. The list of villages was transmitted to Africare and discussed in meetings with coordinating units at the national, provincial and district levels. Africare also became a member of the National Coordinating subcommittee in each of the districts in which it was active.

The work done at each site depended on the conditions of the well. Wells yielding little or no water were deepened, using hand tools and, in most cases, explosives, necessitated by the rocky conditions. A few wells had to be abandoned because the rock was too solid for effective blasting. Wells were deepened to a maximum of 30 meters (beyond which the lack of air makes the work too dangerous), or until the yield (measured by the number of 50 liter buckets of water it took to empty the well during a given time period) was a minimum of 7,500 to 10,000 liters per day, the higher figure corresponding to larger villages. Depending on soil conditions, the deepened portion of the well would be lined or not. In rocky conditions, for example, the well need not be lined as there would be no danger of collapse; however, deepening in this case requires additional care to ensure that existing walls not be undermined or they could collapse into the well. Each well was covered with a slab and a new pump installed, including drop pipes or "rising mains."

It should be noted that in spite of the depth of wells and the extensive use of explosives in well deepening, Africare has been very careful and its safety record, to date, enviable.

b. Quality of construction

Africare's well rehabilitation program in Zimbabwe aimed to restore wells to their original state except with higher yield and additional storage that deepening provided. Africare did not emphasize improving wells to a condition much beyond their original state; thus, providing improved environmental conditions and water quality was not seen by Africare as a major emphasis, at least for the emergency part of the work. This might explain why, although wells appeared to be sealed and pumps installed correctly, many were unprotected, lacking aprons, drains, soakaway pits or fencing. Environmental hygiene, i.e., well protection, in the immediate environs of wells should have been addressed throughout the effort.

The evaluators saw one well being rehabilitated which had been lined with masonry. The team had decided that soil conditions, i.e., rock, did not require lining the deepened part of the well. While the soil conditions did not appear to necessitate lining the lower part of the well to prevent its collapse, the walls lining the upper part of the well had been undercut during deepening. If lower parts of the well were not lined, the upper walls would eventually collapse into the well. All of the wells should be inspected and repaired, if necessary, to prevent this eventuality.

Africare also did not disinfect wells after working in them, a step absolutely necessary to eliminate contamination which would have occurred during deepening and pump installation. Chlorination would have been appropriate and, with minimal training, is not difficult to do correctly.

c. Timing

Africare staff expended considerable effort to achieve their goal of deepening 268 wells within the extended time limit. This involved delaying the related Africa Bureau-funded work and increasing the number of construction teams from 25 to 37.

d. Service delivery

In the target areas, user interviews indicate that most families served by the rehabilitated wells are obtaining 20 liters or more of water per person per day, which is more than UNHCR-recommended emergency rations of 15 liters per person per day. Evaluators did not see long lines of people waiting for water, although users in some villages reported that people from nearby villages are using the same water point.

Users reported improvements in the distance they had to travel and in the waiting time at the water point to obtain water, as well as in the quantity and quality of the water they were able to obtain. Many people reported that during the drought they were taking surface water from unprotected sources such as stock ponds. However, villagers reported that many people in the area had not yet benefitted from the project and still had to walk long distances to obtain water of dubious quality.

Rehabilitation of shallow wells was probably as effective a means as any of providing water relief. The obvious alternative method would have been to drill new wells in the area, however, the costs of procuring and operating a drilling rig would have been very high and little improvement in rapidity of delivery expected, unless more than one rig were supplied.

e. Staffing and training

Africare's expat Drought Coordinator's strong management skills were instrumental in coordinating as many as 37 well-deepening teams at a time. Africare assumed that the local-hire Logistics Officers and Water Technicians would be experienced and trained enough to provide the technical expertise necessary for shallow well rehabilitation. A further assumption was that this basic pool of skills, in combination with the management skills of the Drought Coordinator -- despite his lack of skills in water supply -- would produce the desired results.

Technicians and other personnel were recruited from drilling companies or previous water projects as proposed in the grant agreement. They were trained on the job by other technicians. Unfortunately drilling experience or deepwell construction is not necessarily pertinent to shallow well construction/rehabilitation. The training provided did not extend to areas of expertise beyond those of water point construction/rehabilitation, such as environmental hygiene or community mobilization. The quality of the work and the level of training would have benefitted greatly from the assistance of an experienced water engineer. In fact, employing more personnel with more training and experience in shallow well construction at all levels would have enhanced results.

f. Equipment

All rehabilitated wells were equipped with new handpumps, mostly the locally manufactured Type B Bushpump. The durability of the pump, the availability of parts and the familiarity of the population and the local water agencies with this model make it an appropriate choice for the program.

The Drought Coordinator and the two Logisticians were each equipped with four-wheel drive pick-ups. Additionally, the project had a four-ton and a six-ton truck and two tractors with trailers. Initially these vehicles were to supply and move 25 well-deepening teams; the number of teams was later increased by nearly 50 percent to 37 without the benefit of additional transport. Even though the Logisticians and their vehicles were often pressed into service as transporters, a less than optimal use of their time and talents, teams frequently had to wait for materials and transportation. Additional dewatering pumps would have hastened the work, particularly in the rainy season, as would using powered drills rather than hand-chisels for making the holes in which to place explosives.

g. Operations and maintenance

Since the program involves rehabilitation of existing wells in cooperation with local agencies and communities, post-project maintenance will occur as it has previously. This means wells and pumps will be maintained by village caretakers who are able to perform routine maintenance. For more complex repairs they can call on pump minders who are available in each ward (a ward consists of about 6 villages). For major repairs, DDF maintenance teams will take over. This system is, however, under-funded, and local sources report that pump minders and district maintenance teams often sit idle for months because of lack of funds for spare parts and services, while pumps are unused for lack of repair.

h. Sustainability

Africare's choice of locally available pump models and the coordination of its drought emergency response with the DDF bodes well for the prospect of sustaining the program. While local finances to maintain the emergency work are questionable, a strong probability exists that pumps will continue for some years to produce needed water in Zimbabwe's heaviest hit provinces.

i. Cost effectiveness

To the end of July, Africare/Zimbabwe had spent $411,260 to rehabilitate 229 wells serving an estimated 62,500 people. The population estimate is based on an expected 250 users per well, an increase over the 150 users posited in the proposal. In the absence of concrete population figures -- beyond the scope of the activity to provide -- this figure remains an estimate, and the resulting per user cost of about $6.50 may be conservative. It seems certain that the only feasible alternative, drilling new wells, would have been more expensive, given the high cost of purchasing and operating a drilling rig which would normally be amortized over the life of a longer program, providing more wells.

3. Malawi

Work funded by OFDA in Malawi consisted of well rehabilitation, including: deepening of wells; repair or reconstruction of well linings; replacement of pumps; rising mains and headworks; and improvement or repair of spring protection works. For boreholes, the headworks, pumps and rising mains were replaced. In cases where the rehabilitation of wells or springs was not feasible, they were replaced with new shallow wells.

a. Method of work

As information supplied by the Water Task Force on the number, location and condition of water points proved inadequate, Africare, prior to beginning rehabilitation activities, undertook a field survey or rapid needs assessment, visiting villages in the target districts to inventory water points and their condition. They then met with authorities from the local district government and the Ministries, including the District Commissioner, the District Health Officer, the Health Surveillance Assistant (HSA), the District Community Development Officer and the District Environmental Health Officer, to develop priorities in the area, based on the results of the survey. Priorities were set by need, the status of water points serving the village, population size and hydrogeologic conditions. Such adjustments in response to field conditions, made throughout Africare's Malawi relief effort, have demonstrated its adaptability in the face of inadequate information at the outset and the changing conditions of the drought.

Once priorities were set, the Drought Relief Coordinator met with the Water Supervisors on a monthly basis to set detailed work plans, review progress and resolve problems. Africare also provided both informal, on-the-job training, and formal training in workshops, on the technologies used in implementation of the program.

Following a village's selection, Africare's Water Technician for the area, with the HSA, contacted the village and established a water committee. The construction team, with the help of the villagers, rehabilitated or replaced the water point in accordance with GOM standards. The extent of rehabilitation or replacement work done at a specific site was decided in accordance with site conditions. After rehabilitation, the Water Technician trained the village in pump maintenance and distributed a one-year supply of spare parts. Observations and interviews indicated that certain water committee members knew how to and probably could easily disassemble a pump for maintenance and minor repairs. In respect to the role of local water committees in building the well and maintaining and repairing it, the community participation element of the program appeared to be on a fairly solid footing. Although not part of the terms of reference, this should be considered a real plus for Africare's Malawi program, especially as it appears to have been done without sacrificing the achievement of program targets.

b. Quality of construction

Water points visited by the evaluation team were well constructed, properly sealed and provided with concrete aprons and soakaway pits for drainage. At several sites, however, the wells were sited in low swampy areas locally known as "dambos" or near open wells. This entails a risk of contamination from nearby surface water; surface water points near the wells should be filled in with soil. Future well sites should be located uphill from dambos.

The wells and protected springs seen by the evaluators were not fenced, but since there are no drinking troughs and proper drainage is provided, animals and their waste do not pose a sanitary problem. In any areas where there are animals around the pump, fencing must be provided.

Africare used brick masonry to line the wells; it is cheaper, easier and faster to use than concrete rings, and thus suitable for the rapid response sought for emergency relief efforts. However, especially in view of the mediocre quality of the bricks used, the result is a weaker and less durable well lining and a reduced well life compared to a well lined with concrete rings. Also, mortar dropped into the well must be cleaned out to avoid sealing the bottom of the well or it will prevent the infiltration of water there.

Rocks of six inches to a foot in diameter were being used as fill. While the use of rocks as fill makes settlement of the fill unlikely, if the rocks were loosely packed some shifting may take place and the masonry walls could give in at that spot. Soil, sand or gravel should have been placed with the rocks and compacted in order to forestall such a possibility. Where soil had been used as fill, construction teams in some cases indicated that they did not compact it. This could result in settlement of the soil, cracking of the apron and possible contamination of the well.

On completion of well construction, wells were chlorinated, either by the HSA, or when GOM funds ran out, by Africare following GOM standard procedures. However, to ensure that the water is potable, each well should be tested for contamination before the end of the program.

c. Timing

Although the start of the program was delayed by funding considerations and then by the start of rains, the effects of the drought on both surface and ground water supplies continue to be felt. Surface water flows in rivers and streams remain below normal for the season and ground water has not returned to pre-drought levels. Villagers interviewed in several areas report that some users are still travelling long distances for water, or that the availability and quality of water supplies were a problem until even very recent interventions by Africare.

d. Service delivery

To the end of July, under the OFDA grant, Africare had completed 149 well or spring rehabilitations and 19 borehole rehabilitations. This number had increased to 221 by the time the evaluation report was being finalized. Users interviewed at the water points report using approximately 20 liters per person per day. This is in excess of the minimum/basic standard of 15 liters per person per day recommended by the UN for emergencies. Users also report that there are no long waits to use the pumps; previously, in some cases, women spent all day getting water.

e. Staffing and training

Africare's activities in Malawi benefitted from the employment of a local-hire Water Engineer from the start of activities. Although his services were terminated in April, 1993, the teams continue to follow the standards he trained them to use. Africare also provided a number of training sessions on the technology used. The program was fortunate to be able to hire about 80 percent of its staff from a previous Africare water supply project; thus personnel problems have been kept to a minimum and most of the staff had appropriate experience. Both training and experience were reflected in the

overall good quality of the work. Training of ten Water Technicians heading the construction/rehabilitation fell short of the target of 17 technicians trained but was appropriate in view of the reduced number of water points.

f. Equipment

Pumps used are as follows: for borehole rehabilitation, Afridev pumps manufactured in India, and for shallow wells, Madzi and Shire pumps manufactured in Malawi. Both are village-level operation and maintenance (VLOM) pumps; the Madzi pump costs approximately U.S. $200 and the Afridev pump about U.S. $350. The Afridev pump is meant for heavier use and is more appropriate for the size of the populations served by the program, even on shallow wells, than the Madzi pumps. Excessive wear and tear on the Madzi is more likely, since it is designed for lighter use than the Afridev pump. To compensate for this shortcoming, in villages of high population, more than one well was constructed and fitted with a Madzi pump, thereby increasing the longevity of the individual pump. (Four years earlier Africare had installed Madzi pumps in Lilongwe; these pumps were reported still to be in good running order.)

A problem with the Afridev pump, however, is its availability and cost; it either takes four months for surface shipping or costs U.S. $350 per pump for air shipment. Consequently, Africare decided to use the Madzi pumps. However, the GOM Water Affairs Department did not approve the Madzi pump for use in spite of promises to the contrary, and Africare changed to the more expensive Shire pump.

While the Madzi pump will supply water in the short term, either the Afridev or the Shire pump would have been the preferred pumps from the start, since they would have provided a longer-term, more sustainable solution. The Shire pump, however -- a newly-manufactured Malawian hand pump -- was not available during the first half of the project period. Furthermore, the Afridev pump, the ideal choice on mechanical grounds, was cost-prohibitive and therefore would have required additional funding.

Borehole rehabilitation should have included blowing the accumulated sediments out of the hole, using a compressor. However, Africare's budget did not include provision for a compressor, and they were unable to obtain use of one elsewhere. This has particular impact in a drought situation where the additional storage provided by the removal of the sediment, and the extra depth to which the foot valve or intake of the pump can be placed, would provide additional water for pumping.

Transport for water teams, tools and materials was provided by a six-ton truck and two tractors and trailers. The Drought Coordinator felt that more trucks in lieu of the tractors and trailers would have been appropriate, since they are faster and more able to supply the construction/rehabilitation teams. The lack of trucks or other additional transport produced a bottleneck, with teams sometimes having to wait for materials and transport.

g. Operations and management

According to Save the Children/UK's Drought Coordinator, about 60 percent of the water points in Malawi are inoperative at any given time. This indicates the weak capacity of the Water Affairs Department to assist communities with operation and maintenance. Given this weakness, the VLOM pumps chosen by Africare and the training given to villagers in their use and maintenance will help assure that pumps are correctly used and maintained.

h. Sustainability

The effectiveness of the village mobilization and participation in program activities in Malawi augurs well for the sustainability of the water activities. Parts for the pump models installed are locally available, and they are all VLOM pumps. Furthermore, Africare has been able to include training for villagers in pump maintenance in its activities, and has provided villages with a supply of spare parts intended to satisfy pump maintenance needs for one year. In the long run, however, Malawi needs to establish reliable, effective systems for cost recovery, spare parts supply and eventual pump replacement for this or any other water activities to be truly sustainable. The other issue mitigating against long-term sustainability is that the Madzi pumps used in some villages will not stand up for long to the heavy use imposed on them. They will most likely break down and need replacement within a few years. In fact breakdowns have already been reported for some new pumps.

i. Cost effectiveness

Under the OFDA grant, Africare/Malawi has spent U.S. $342,425 and completed the rehabilitation of the estimated 169 water points to the end of July. Using population data provided by the GOM, the number of beneficiaries is 67,179, which gives a cost of U.S. $5.10 per beneficiary. Given that Malawi's drilling capacity, both public and private, was already being used by other NGOs, there appears to have been no real alternative. Furthermore, it appears unlikely that these populations would have been served by the other NGOs active in the water sector in spite of their need. Comparisons to costs for other NGOs, which were unavailable, would in any case be of limited use since the conditions under which the water is provided vary from area to area.

4. Zambia

The work initially proposed by Africare for funding under the OFDA grant comprised the rehabilitation of 120 shallow hand-dug wells, usually equipped with a windlass and bucket, and 120 boreholes equipped with handpumps. In surveying the districts, however, Africare field staff found that there were more boreholes than shallow wells. They consequently adjusted the targets to 180 boreholes and 60 shallow wells. The change had the effect of increasing the beneficiary population from an estimated 102,00 to 125,000, since water can be raised more efficiently with a handpump than with a windlass and bucket, effectively increasing the number of people who can be served.

Borehole rehabilitation consisted of the repair or, more often, replacement of pumps, including drop pipes; it also included repair or reconstruction of headworks, including the walls around the wells, the apron, well cover, drainage and soakaway pit. Shallow well rehabilitation consisted of deepening and relining the well, if necessary, and repairing or replacing the headworks, including well walls, apron, windlass supports, windlass, chain and bucket. A few shallow wells were equipped with handpumps, in which case rehabilitation consisted of well deepening and relining, headwork repair or rebuilding, and repair or replacement of the handpump. If the community desired, Africare also provided technical assistance and cement for community construction of animal drinking troughs.

a. Method of work

The Water Department of Zambia's Ministry of Energy and Water Development supplied the preliminary information used for defining target areas. Once implementation started, however, Africare's field staff found that the lack of accurate information on the condition, location and number

of water points required that it to make its own survey or rapid needs assessment for each district. Information on water needs, that is, requests for intervention from communities in need, were passed from the community to the Province through District Councils. Africare verified the information by visiting villages in order to develop a list of beneficiary villages and a work plan. Although during the rainy season selection of work areas was dictated by road conditions, Africare otherwise found it expedient for logistics and supervision to work in a systematic way from one end of a district to another.

Prior to commencing work in a village, Africare's Water Technician would visit the community to discuss the program with them and organize it to provide its inputs. The community would be asked to clear the site, bring sand and stones for construction, and organize labor to assist Africare's water team. Water Technicians made as many as five visits to a community to assure its cooperation. In many cases, as villages which had been reluctant to participate saw their neighbors benefitting, they would decide to take part. Only at facilities such as clinics would Africare proceed without community participation, using only its own personnel to do the work. Involving the community allowed the Water Technician to split his teams among several villages and accomplish more work in a given time period. In addition, it gave the community a sense of ownership of the water point, including responsibility for its maintenance.

Once the community inputs were in place, Africare team members would go to the village and, with the community, proceed with the water point rehabilitation. As noted above, the work done depended on the condition of the water point, ranging from simple pump repair to virtual reconstruction of wells. Most work was done by hand; well deepening sometimes required blasting.

b. Method of construction

The quality of the construction was generally quite good, although at some boreholes drainage was not adequate. This was usually due to the inadequacy of existing headworks, especially aprons that were too small. Also, in some cases existing animal drinking troughs were too close to wells or boreholes and most water points were not fenced, although one of Africare's Water Technicians told the evaluators that he refused to install pumps on boreholes until the community had fenced the area. Inadequate drainage around some water points raises the possibility of contamination of the well or borehole by infiltration of surface water; the presence of animals around the wells adds to the likelihood of contamination. As in Zimbabwe, Africare did not take it as part of emergency relief activities to improve on existing, functional facilities but rather to restore non-functional water points to the production of water.

Although it would have added to the complexity of the task, requiring additional personnel and equipment, boreholes should have been cleaned out with a compressor if necessary. The additional storage capacity gained by removing accumulated sediments can be especially important in a drought.

c. Timing

The late start of the program had a number of ramifications for the work. The program began in September 1992, with procurement, staffing and other start-up activities requiring the first few months; actual construction activities began in November just as the rains were starting. The rains made many roads impassable, rendered dewatering and construction activities more difficult, and often left crews stranded in areas inaccessible for up to three weeks. Also, Africare had to work on sites adjacent to

principal roads, rather than following a work plan dictated by expedience or need. After the rainy season, populations less accessible were serviced. This largely accounted for low numbers of wells and boreholes rehabilitated during the first part of the program.

The tempo of the work picked up as the teams became accustomed to the work and the rains ended; the extension to the grant will allow Africare to make up the lost time. Africare expects to be able to meet or exceed its targets before the end of the extension and beginning of the next rainy season.

d. Service delivery

As of the end of July, 1993, Africare had rehabilitated 62 shallow wells and 149 boreholes, reaching an estimated 102,000 beneficiaries. Because of the lack of accurate population figures for the area, the number of beneficiaries can only be estimated; Africare/Zambia uses figures of 500 to 600 people served by a handpump (borehole) and 400 to 500 people served by a windlass/bucket (shallow well). These figures assume that the wells and boreholes are used nearly to capacity, an assumption which is difficult to verify. However, Africare has been careful not to rehabilitate wells or boreholes that are too close together in sparsely populated areas, so in a few cases the figure may be conservative.

Africare expects to exceed the revised target of 60 shallow wells and 180 boreholes by ten to twenty water points. Exact numbers will depend on conditions in the field between the end of July and the end of the extension. The total number of beneficiaries is expected to exceed 125,000.

Users indicated that they were using about 20 liters per person per day, except in the case of one user who said she lived further away and was supplying only 10 liters per person per day to her family. This example suggests that the provision of potable water sources closer to users provides people with more water, saves time, and in many cases, improves the quality of the water available. The increase in the quantity and quality of water should have an additional salutary effect on the health status of the population served. Wells are routinely chlorinated prior to turning them over for public use. Africare proposed that, since it has no control over subsequent use of wells, District Water Affairs do periodic testing and treatment. The evaluators did not observe long queues of people waiting to be served, although in some areas wells were being used by people coming from several villages.

e. Staffing and training

Both the Drought Coordinator and the Water Engineers have experience and skills appropriate for the task. The Water Technicians and their teams have participated in training sessions as well as on-the-job training and now work relatively smoothly and efficiently. Teams are often split up and work in several villages at a time, thereby increasing their efficiency. Each Water Engineer has a pick-up truck and there are sufficient tractors and trailers with drivers to move the field teams from site to site and keep them supplied with materials.

Community participation has been fairly successful, according to the Water Technicians, who assist the villagers in mobilizing to provide their inputs. Some of the Water Technicians have proved more effective at organizing the communities than others, which has allowed them to work more efficiently. Although not normally part of an emergency relief effort, community mobilization has allowed water to be provided to more people more rapidly and at a lower cost than would otherwise be the case. Some training in community organization and mobilization, although perhaps beyond the scope of the

program, might have assisted the Water Technicians in this component of their work, especially as there were no other GRZ entities or agents to assist them.

The level of staffing as well as the qualifications of Africare's staff have made it possible for the project to accomplish its goals under budget, efficiently and with few complaints from field staff.

f. Equipment

Wells were equipped with windlasses with buckets for raising water. Boreholes were equipped with new India Mark II pumps except for fifty Bushpumps obtained from Zimbabwe to facilitate start-up. A few India Mark IIIs were installed as well, and some existing pumps were repaired rather than replaced. With the exception of the India Mark III, these pumps are not VLOM pumps.

In many countries where structures are in place to support operations and maintenance, the installation of handpumps on shallow wells as well as on boreholes is preferred. The reason is that the wells can be sealed and the danger of contamination from dirty buckets, ropes and surface water is significantly reduced. However, in Zambia, existing government structures are, even according to the people who staff them, inadequate to provide pump maintenance services. Therefore the windlass and bucket is probably a better choice. Maintenance is far easier and cheaper and there is the possibility of continued use of the well to provide water, albeit of lesser quality, even with total loss of the windlass. As noted in the U.N. Handbook for Emergencies, it is better to provide an adequate quantity of water of moderate or good quality than a small quantity of water of very good quality.

g. Operations and maintenance

Because the pumps used were not VLOM pumps, without trained pump mechanics or a reliable source of spare parts, community maintenance can go only so far to prolong the period before breakdown of the pump. However, given the above-mentioned lack of funding and capacity of the GRZ, it is unlikely that government structures will be able to assist significantly with operations and maintenance. VLOM pumps, e.g., the Afridev or India Mark III, would have been more appropriate for the boreholes than the Bushpump or the India Mark II. Both of these pumps require the intervention of trained mechanics with special tools. Africare's position, that providing the community with the training to be able to repair the pumps is beyond the scope of the program, is correct in view of the emergency nature of the activity. However, the provision of such training is probably more feasible than it is for the GRZ to provide pump maintenance nation-wide in the near future.

h. Sustainability

As noted above, the sustainability to be expected from the shallow wells equipped with windlasses is excellent. The level of community participation experienced during the program indicates that the communities were motivated to provide self-help to obtain clean, secure water supplies. The ease and low cost of shallow well and windlass maintenance means that these water supplies should prove sustainable, although the quality of the water provided may not be as good as could be expected had the wells been equipped with handpumps.

Since the servicing the handpumps is problematic, although they provide good quality water rapidly in an emergency, boreholes equipped with handpumps probably will not contribute greatly to satisfying the area's long-term water needs.

i. Cost effectiveness

According to Africare, expenditures under the OFDA grant to mid-July amount to U.S. $612,980 to complete 211 water point rehabilitations serving an estimated 102,000 users. This gives an estimated per-user cost of U.S. $6.00. This cost was obtained by dividing the total expenditures by the projected number of beneficiaries. As noted earlier, population figures for the area are unavailable, requiring that this calculation be made using the projected numbers of 400 to 500 users per shallow well and 500 to 600 users per borehole.

The short-term nature of the program, giving a small time period over which to amortize equipment, vehicle and start-up costs, gives rise to a relatively elevated cost per beneficiary. Africare estimates that if it were allowed to continue the program, per-beneficiary costs would drop to U.S. $3.50.

As in Zimbabwe and Malawi, costs of rehabilitating wells and boreholes (especially shallow wells) should compare favorably to the cost of new construction, especially the costs of drilling boreholes. This is caused by the high price of the drilling equipment and its operation, and the relatively low numbers of wells that can be drilled over the life of a short program to amortize the initial investment. In some cases, the cost of rehabilitating badly damaged shallow wells may approach that of constructing a new one but would not exceed it. Windlasses and buckets are a very-low cost way of raising water.

Community participation, whose inputs include materials such as sand, stone and gravel, and labor, in some villages even skilled labor such as masons, significantly cut costs as well as allowing more efficient use of Africare's own teams.

C. Approach and Management

1. Zimbabwe

The regional management of the program from Washington, including procurement, may have saved time in doing paperwork. Other than this clear benefit, the question was raised earlier of whether this was an effective approach to planning the emergency drought relief in the detail it required. In support of the approach, Africare's Drought Coordinator in Zimbabwe thought that the two regional conferences held by Africare, one in Zimbabwe on water relief project administration in September, 1992 and the other in Zambia on issues of drought mitigation in May, 1993, were useful. One field visit each by Africare's Washington-based Southern Africa regional director and regional drought coordinator allowed the Washington office to get a hands-on view of the three-country effort.

While the Africare Drought Coordinator was a highly effective organizer/administrator, his position needed greater reinforcement by a technical counterpart, more specifically, a Water Engineer. This arrangement would have enhanced the results already achieved by the program, thereby avoiding some of the environmental hygiene problems discussed elsewhere in this report.

2. Malawi

Africare's regional approach to the design and management of the Malawi portion of its portfolio was perceived as problematic by U.S.A.I.D./ Malawi. On the design side, U.S.A.I.D. has suggested that the original targeted number of water points was too ambitious. In retrospect this is correct and

perhaps more could have been done at the outset to justify the proposed numbers. It appears, however, that accurate information on the number, type and condition of water points in the southern districts was unavailable. Although in hindsight Africare might have proposed more accurate numbers, this was a "best guess" rendered at the beginning of the drought and not a definitive estimate. In any case, no one would contest that the inhabitants of the southern districts were at the time in absolute need of emergency water provision.

On the management side, U.S.A.I.D. expressed some confusion about Africare's early monitoring and reporting of the program, resulting because Africare reported on the OFDA and Africa Bureau portions of the program as if they were one program. Later in the effort, reporting on the two activities was separated, which seems to have remedied the situation.

3. Zambia

As in Zimbabwe and Malawi, the drought relief was directed by the Africare Drought Coordinator and implemented by his Field Engineers, Water Technicians and construction/rehabilitation teams. Here, though, the Country Director played a larger role in identifying drought areas of greatest need and, within those, possible sites for rehabilitation for the proposal. Together with Africare's Field Officer and in cooperation with the Water Affairs authorities, the Director paved the way, perhaps more smoothly than in the other countries, for the commencement of the relief work. As in Malawi, however, the list of sites provided by the GRZ needed correction and updating in the field.

The Africare regionally-based approach as applied in Zambia has been effective in bringing into play the relevant authorities and affected communities in the water relief effort. Community participation has had, as in the other countries, mixed results. The men in particular always seem to have "funeral to attend or harvest to bring in."

D. Effects on Social, Economic, Health and Environmental Conditions

1. Zimbabwe, Malawi, and Zambia

The three countries are treated together in this section since the short-term effects of the emergency relief in each country are quite similar to one another. This is not to say that differences do not exist. Surely, the social, economic, health and environmental conditions in each of these countries were different prior to the drought, so differences at the end are to be expected. Nevertheless, the kind -- if not the degree -- of impact of Africare's program is shared by the countries and can therefore be treated in common. Furthermore, since the lack of a baseline makes a finely calibrated and quantifiable measure of program impact on those affected impracticable, it is appropriate to treat any impact in a unitary fashion.

Short-term effects of the emergency drought relief effort on the social and economic conditions of the affected populations are difficult to tease out systematically from the collected data. Several issues arise in trying to answer questions about the impact or presumed impact of the relief. One such issue concerns the fact that, according to interviews, many water sources were not yielding sufficient, much less potable, supplies of water even before the drought. Another is that Africare's scope of work did not specify standards for well protection. Hygienic conditions around some wells was already unacceptable from an environmental health perspective and Africare did not always improve them. As a result, water quality at some rehabilitated water points was compromised. Yet another issue is that

the drought "ended" before water relief efforts were completed; however, the effects of the drought are still prevalent in many parts of the districts visited. These issues complicate the analysis of relief impact on affected populations.

Site observations and interviews with end users -- women transporting water to their homes -- led to several general conclusions about the effects of the emergency water relief program. First, in communities where water point rehabilitation had been completed, the time needed to obtain water was reduced greatly from the drought, because both distances to travel to the water point and queues for turns at the water point were reduced. Anecdotes abounded about waiting in queues at the few usable water points in the dark of early morning during the drought. Second, in addition to greater availability of water, end users attested that they found the water to be of higher quality. There is little evidence in any of the three countries of migration due to the drought; however, in Zambia officials reported trucking water to communities without water.

It is safe to say that the timely delivery of water to thousands of dispersed inhabitants has resulted in an immediate improvement in their lives. The improvements have, in turn, allowed them to devote more time to taking care of children, food production and preparation, and other productive activities.

Clearly many inhabitants affected by the drought, especially poor, rural inhabitants, lost economic property. Most lost crops. Cattle losses (where they are kept in significant numbers) according to local interviewees, ranged from 30 percent to 100 percent of their herds. The losses resulted mainly from the lack of rains in the 1991 - 1992 season, resulting in failure of crops and lack of grazing for animals.

Officials also reported considerable loss of cattle due to an epidemic of "corridor disease" or theileriosis, a tick-borne protozoal disease. Spread of the disease was facilitated by increased movement of animals to, and concentration of their numbers at, the fewer available stock watering points. Mortality from the disease was likely increased by the poor condition of the animals due to lack of grazing and water and the stress of movement.

Loss of animals and crops had an effect on post-drought recovery in that the losses included both the loss of seed and of draught power for plowing, i.e., oxen. It is doubtful that the program, intended to supply potable water for human consumption on an emergency basis, could have or was intended to prevent such losses. The construction of dams for animal watering holes was part of the Africa Bureau-funded part of the program, but will have been too late to prevent losses during the drought of 1992.

The causal association between emergency water relief and health conditions of affected populations is more difficult, if not impossible, to pinpoint than the social or economic effects. A controlled study beyond the scope of this evaluation would be necessary to determine precisely the impact of the supply of emergency water relief on the health status of beneficiaries. Furthermore, a solid baseline would have to have been developed before the drought so that conditions before, during and after the drought could be studied and other factors affecting the outcome isolated.

Nevertheless, the link between health and the availability of water in both sufficient quantity and quality has been established beyond doubt by a number of studies. And, since the evaluators held numerous interviews -- approaching a dozen for the three countries -- with health officials in many of

the districts visited and since health statistics were occasionally available for the immediate pre- and post-drought periods, it is useful to review briefly some of the findings.

Health officials were unable to attribute any deaths directly to lack of potable water. However, they did report that incidence of diarrhea increased considerably for all age groups but especially in the under five-year-old group. All three countries reported epidemics of "bloody diarrhea" or dysentery, and in Malawi one District Health Officer had statistics showing sharp increases in the incidence of shigella and of unconfirmed cholera, both related to inadequate sanitation. Whether these and other diarrheas were due more to lack of water in sufficient quality or quantity, were a side effect of malnutrition (marasmus and kwashiorkor in children), or both, or still other factors, is not clear. Some officials indicated that incidence of diarrhea could be caused not just by the consumption of poor quality water, but by an absence of sanitation during food preparation caused by lack of water, or because the lack of food at home led to the purchase of poorly prepared food in markets.

Other diseases reported to have increased during the drought period include the following: scabies, TB, pellagra, bilharzia, trachoma, and conjunctivitis. Both scabies and conjunctivitis are related to personal hygiene and can be assumed to have been aggravated by lack of water for washing; both are highly contagious and scabies particularly difficult to eradicate from an area. Pellagra is the result of malnutrition in adults; and the incidence of TB can be related to the increased susceptibility of populations weakened by malnutrition. An increase in bilharzia, caused by a parasite which enters through the skin, was probably related to increased numbers of people, while bathing or collecting water, immersing themselves in ponds or other water where the disease is present rather than getting water from a protected source. However, complicating the task of determining specific vectors for these diseases without study is the fact that many of them, such as conjunctivitis, normally have seasonal outbreaks.

Nonetheless, it is safe to say that the lack of potable water or of water for hygienic purposes is related to an increase in the incidence of many of the above diseases. Health officials were able at least to say that the use of unprotected water sources -- a problem exacerbated by drought -- is clearly a contributing factor if not a cause of many of the cases of diarrhea and of other diseases they treated. With the end of the drought and the provision of potable water, their incidence has declined and will continue to do so.

V. CONCLUSIONS

A. What has Worked/Not Worked

1. What has Worked

a. Regional approach

The regional approach to emergency water relief, in its conceptual form, makes good sense. Provision of water relief to drought-stricken rural populations in these three former British colonies in southern Africa with their similar governmental, administrative, tribal, and community structures and their common approach to water delivery made Africare's approach consistent with local efforts throughout the region, resulting in an efficient and rapid delivery of services.

A single grant agreement with an NGO that is already established in each of the three countries, as Africare was, is an appropriate mechanism for a rapid response, emergency approach. Africare's hands-on effort in cooperation with host country authorities and local communities in bringing emergency water relief to the most needy rural inhabitants was in Africare's manageable capability. Overall management from the its Washington office with responsibility to A.I.D./Washington also seems plausible, given the economy of scale which can be achieved through common procurement, the single reporting function, and the overall similarity of the three country programs. On the assumption that individual U.S.A.I.D. Missions would not be required to give much management attention to the activity, but would be informed of periodic results of the effort, meant that no single Mission would have to provide direct management for the effort.

The above defines the ideal picture. Based on that, Africare has developed an appropriate organizational structure for implementing its program. Although there have been some problems in adequately staffing the activity with the appropriate technical personnel -- particularly in Zimbabwe -- this structure has helped enable Africare to adjust its targets to realities in the field and then to reach those targets in the three countries.

b. Technical approach

The rehabilitation of existing water points proved to be a rapid, low-cost way to supply additional water to drought-affected populations in the target areas. Even in Zimbabwe, where deepening individual hand-dug wells was a time-consuming process, the number of teams fielded (37) will allow the completion of the revised target of 268 wells within the period allowed by the extension. A single drill rig probably could not have produced a larger number of water points and the cost would have been significantly higher.

Community involvement, usually considered more appropriate to development projects, also proved instrumental to the achievement of program goals in both Malawi and Zambia. Community contributions of materials and labor for water point rehabilitation both kept costs down. They also allowed the use of fewer project personnel at activity sites, allowing rehabilitation teams to split up and cover more villages within a given time period. The severe need for water produced by the drought probably motivated beneficiary populations to participate, reducing the time and effort that might otherwise have been required for community mobilization.

Although two of the U.S.A.I.D. Missions said they felt that other organizations had a "comparative advantage" in the water sector compared to U.S.-based NGOs such as Africare, the evaluators found no evidence that the program replaced or supplanted programs by other NGOs or by host governments that would have met the needs addressed by the program. It seems almost certain that the beneficiary populations would simply not have been served had this program not been implemented.

2. <u>What has Not Worked</u>

a. Regional approach

The relationship of Africare to the U.S.A.I.D. Missions has not been satisfactory. This is partly a function of the perception that the emergency water relief initiative was an A.I.D./Washington and Africare idea that did not have sufficient input from the Missions and would take place with or without their concurrence. In all three cases, the U.S.A.I.D. Missions were heavily involved in food

relief and did not feel they had the staff or the expertise to handle a water relief program. In one case the resistance of the U.S.A.I.D. Mission may have contributed to the delay of the grant agreement and consequently of the entire regional effort. That delay drove the start of the activity into the rains, when difficulties of access and construction caused still more delays. As noted earlier, the rains did not end the effects of the drought on the water supply, but did delay program activities.

b. Technical/organizational issues

For at least two reasons A.I.D./Washington divided Africare's proposed activity into "relief" and "development" components. One reason was the purported lack of sufficient funding in a single source and thus the need to locate funds in two bureaus. Another, uncovered in a review of a draft of this report, was the conviction on the part of the Africa Bureau that certain activities proposed were, indeed, more "development" than relief in nature. The distinction made between the two was that the relief component rehabilitated existing water points, and the development component created new sources. As far as the evaluators could see, however, the aim of both activities was, in reality, to provide potable water on an emergency basis to drought-stricken populations. Its main effect was to complicate reporting, administrative, and financial procedures, as field staff and the Missions struggled to keep the two separate in spite of shared personnel, equipment, administration and often, target areas. In Malawi, Africare treated the two activities as one, separating them only for reporting purposes. In Zimbabwe the two were clearly distinct in both the geographic area covered and the type of intervention. In both Zambia and Zimbabwe, the implementation of the "relief" activity was given priority over the "development" activity. In Zambia, given the nature of the "development" work there, i.e., the rehabilitation and construction of stock dams, which will not be filled until after the next rainy season, this decision was correct.

Another ill-defined area was exactly what the water relief activity consisted of, especially in view of the relief/development split imposed on the program. Africare staff in Zimbabwe, for example, interpreted their mandate of rehabilitation as the restoration of wells to production of water, without improving well protection. In some cases this led to environmental hygiene conditions that could allow contamination of the well by surface water carrying animal wastes. In Zambia this was true to a lesser extent, and in Malawi, the rehabilitation included well protection which, combined with the absence of animals, made such contamination less likely. The fact that the relief program consisted of rehabilitation of existing water sources rather than construction of new ones presented constraints to the improvement of environmental conditions, e.g., sites already selected may not have been ideal. However, water points unlikely to provide water of acceptable quality should not be rehabilitated.

The program did not address the general issue of water quality in any substantive way. While in general it is better to provide a sufficient quantity of water of good or even moderate quality than to provide an insufficient quantity of very good quality water, the issue is not one that should be ignored in an emergency. The water provided must be potable or improvements in health will not be realized; in extreme cases health conditions may even be worsened. Water quality must be assured by protecting the source or treating the water, by chlorinating water points after working on them, and by testing the water. Without analysis of the water quality, the nature and gravity of possible contamination is impossible to estimate; untested water cannot be assumed to be potable.

Another question was which conditions at individual water points were drought-related, rather than pre-existing problems related to inadequate or improperly maintained infrastructure. In at least one case, for example, Africare was deepening a well that had never given water. In Malawi, SCF/UK

reported being asked to drill wells in areas where previous drilling programs had very limited success. In other cases, it is likely that rehabilitated pumps had not worked for years previous to the drought. Complicating the question, in many cases an exact determination of the cause of the problem after the fact was impossible; in many others the distinction between drought-caused and previously existing problems was unclear. Also a factor was that the drought may have exacerbated existing problems to the point of crisis, for example, by making alternate water sources unavailable. In view of the lack of time for investigation, Africare in most cases assumed that all water problems were drought-related and based its selection of water points on other criteria, such as need. This was a reasonable approach under the circumstances.

In Africare/Zimbabwe the proposal stipulated an insufficient number of water teams and inadequate transport. This constrained speedy and efficient implementation of the program, although the efforts and dedication of Africare's teams minimized the impact of the problem. In assigning Drought Relief Coordinators who had little or no experience or training in the water sector to Zimbabwe and Malawi without ensuring that they were adequately assisted by technicians with that expertise, Africare risked compromising the effectiveness of the program. In Malawi, the employment of a Water Engineer for the first part of the program ameliorated the problem. A Water Engineer should have been employed to assist the Drought Coordinator in Zimbabwe with the administration as well as the technical component of the activity. Furthermore, as mentioned earlier, the small numbers and the types of vehicles for the transport of teams, tools and materials created significant bottlenecks in Malawi and even more in Zimbabwe.

The combined three-country approach could have solved some of the technical problems that have plagued the project. Participation in the program design by an experienced Water Engineer or Technician could have helped assure the provision of more appropriate staffing and equipment levels in all three countries, increasing the effectiveness and efficiency of the project. During start-up, technical assistance to each country by a regional water engineer could have assured that consistent, acceptable standards for construction, rehabilitation and environmental hygiene were set and met in each country, and provided or recommended training for country staff, if necessary.

Although the goal of the activity was the provision of emergency water supplies, wherever possible the methods used should maximize sustainability. Given the inadequacy of government structures, especially in Malawi and Zambia, only VLOM pumps with locally available parts should have been installed and training in their use and maintenance provided by Africare. The provision of such training to villagers in Malawi without compromising the achievement of program targets enhances sustainability.

B. Timeliness of Expected Results

For the most part Africare has achieved the intent of its drought relief effort, to provide water in a reasonably timely manner to many of the needier inhabitants of hard-hit drought areas in the southern regions of the affected countries. Targets have been achieved in spite of delays caused by late funding, rains, bottlenecks resulting from inadequate transport, and the lack of adequate prior information on the location, numbers and condition of water points.

As mentioned earlier, although the drought has officially "ended," water deficits remain and populations are still in need of emergency relief. Also at the time the grant was made, the uncertainty that the 1992 -1993 rains would be normal must be taken into account.

C. Problem Solving

Africare has demonstrated an ability to adapt its administrative, organizational, and technical energies to meet changing needs. Given the lack of accurate information and the changing field conditions of the three countries, targets set should have been tentative and the necessity for further needs assessments taken into account in designing the activity. In any case, Africare has been able to shift gears quite rapidly in responding to new information and altering conditions. Decisions made in the field in response to altered or unforeseen conditions have been appropriate.

D. Validity of Initial Assumptions

The assumption that a regional approach to emergency water relief is an appropriate mechanism remains valid. The effort, however, invalidates the assumption that an emergency water response can and should be combined with a simultaneous effort to develop (presumably) non-emergency water resources. Doing either one or the other seems preferable or, if the distinction is an artificial one, the activity should not be separated into those two components in the first place.

The assumption that the effort would meet a real need in a timely manner was also a valid one; if the assumption was made that this effort was sufficient to meet all drought-related water needs in the target areas, that was invalid.

Africare headquarters clarified to the evaluators that it did not assume that the U.S.A.I.D. Missions would be receptive to its proposal. In fact, part of the initiative came from the Africa Bureau, which had expressed an interest in a major, regional proposal to provide relief. Africare assumed that Missions would have to be persuaded on several grounds: administrative capacity, technical capacity in the water sector, and, in the case of Zimbabwe, acceptance that water was a serious part of the drought.

Yet another assumption concerns the earlier-mentioned "improved" versus "original" condition of completed wells. The implication that the rehabilitation of water sources would automatically provide water of acceptable quality is not necessarily true, especially since standards for rehabilitation and for water quality were not defined in the grant agreement.

In dividing the program into "relief" and "development" components corresponding respectively to rehabilitation and to new construction of water points, the assumption (if it was made) that the establishment of new water points is not relief is arguable. For example, drilling boreholes can be a rapid, albeit expensive, way of providing water of good quality to a relatively large number of people.

E. Lives Saved and Property Protected

Although some lives in each country were purported to have been lost due to the drought, such losses were probably due more to a combination of factors such as malnutrition and disease than simply to water-borne disease or lack of water to drink. Certainly there would have been indirect effects on the health of the target population which may have resulted in saved lives. If lives saved can be attributed to the improved availability and quality of water provided by the program, it was probably in vulnerable groups such as children under five. Since this topic has been discussed earlier in the report, suffice it to say that interviews with health officials indicated that the drought did affect health and that part of these effects were the result of inadequate quantities and poor quality water. That the

combined emergency food and water relief saved the lives of thousands and thousands of people during the drought is indisputable.
While no records of forced migration due to the drought exist, most families in Zimbabwe and Zambia lost at least one-third of their main economic asset, cattle, and in all three countries at least one harvest. The program was not meant to address these losses.

F. Unanticipated Results

While not wholly unintended, the community participation that occurred in Zambia and Malawi and, to a lesser degree, Zimbabwe, was a "bonus." That such participation helped to make well water safer than it otherwise would have been was a benefit, as were time and cost savings to the program. Community participation should also have a positive effect on sustainability.

G. Sustainability

While sustainability is not the most pertinent issue for an emergency relief program, it is relevant. Africare's cooperation with provincial and district water affairs authorities has given them experience in providing emergency water relief. Also, since district councils and local communities participated in the decision-making and work of constructing wells and boreholes and, because some communities have been trained in maintenance and minor repair of water points, there is an element of potential sustainability in the activity. However, a measure of which elements of, or the degree to which, the activity will be sustained is not certain, especially since varying conditions such as cost recovery, local government capacity, pump model and village capacities will all affect the outcome.

H. Cost Effectiveness

Africare has achieved its targets within budget, although changes in the program necessitated changes in expenditures for different line items. On a per capita basis, the cost per inhabitant of water point rehabilitation varies between U.S. $5.10 and $6.50. Comparative data from other NGOs, agencies or firms were not available to the evaluators. In any case, such comparisons would be of limited validity or relevance because of the significant effects of a large number of variables. These include, to name a few, the accessibility of and distance to target areas; differing hydrogeological conditions; different types of activities and technologies; different population densities and local capacities; the extent of government support; and local government capacity and local facilities, both within a country and among the three countries.

VI. RECOMMENDATIONS

A. Changes Needed to Enhance Project Success

1. Water Quality - Zimbabwe

In the implementation of Africare's Zimbabwe program a shift in the remaining months from the rehabilitation of additional wells to the protection of already rehabilitated wells would raise the possibility of achieving "success" to a higher level. Since the Revised targets nearly are met, and environmental hygiene conditions around the rehabilitated wells leave open the possibility of well

contamination by surface water, so that the delivery of safe, potable water can not be presumed. The evaluators believe the following actions will improve water quality of deepened wells:

- installation of an apron around each well
- disinfection of wells after completion of rehabilitation
- provision for the drainage of excess water away from the well and for the construction of soakaway pits
- removal of animal drinking troughs (if any) to at least 30 m. from wells
- fencing of the well area.

Were these actions to be taken there would be trade-offs between improving well protection and the completion of the original target of 300 wells. Cost, technical staff, time, and level of community participation, are just some of the considerations. However, improving the environmental health conditions of the completed wells would improve the potability of the water supplied by the program, providing greater benefits to beneficiary populations than just deepening additional wells.

B. Design and Management Issues

1. Packaging

The packaging of Africare's regional approach by A.I.D./W as two activities consisting of a drought relief effort and a developmental undertaking has some flaws, reviewed earlier. The solution, especially in its implementation, is to respond in a unitary manner, that is, the emergency should have been treated either as an emergency or as a development activity. Granted, the relief provided by Africare under auspices of OFDA has very clear developmental features -- especially in the domain of community participation -- but these features have served to enhance the rapidity and cost effectiveness of the activity. The main thrust of the activity remained the emergency provision of water. That available funding levels required a split of the proposed activity is understandable; that implementation, management, and reporting were separated was unfortunate. It tended to complicate the role of the U.S.A.I.D. Missions, which already saw the grant agreement as having been forced on them. Similarly, the split meant that this evaluation only covered the OFDA portion, omitting the Africa Bureau component, which also responds importantly to the drought.

2. Technical/organizational issues

a. Water Quality

Water quality standards and the standards of construction and environmental hygiene should be specified in the design. Provision for simple, economical water analyses, assuring that the water quality standards have been met, should be included in the budget.

C. Sufficiency of Resources to Achieve Desired End Results

1. Staff and equipment

The input of experienced Water Engineers should be included in the design of programs to ensure that the level of inputs correspond to the expected outputs of the project. Some technical oversight must also be provided during implementation, especially start-up, to ensure that adjustments to changed or

unforeseen conditions in the field are appropriate and that construction and water quality standards are set and met. Equipment, funding and time must be commensurate with the outputs expected.

2. Follow-up

The water relief program would be ideal for a follow-on activity which would allow continuation of water points rehabilitation. Unmet water needs in the target areas and beyond could be satisfied. Further, completed activities could be greatly enhanced by additional, developmentally-directed activities, such as health education, intended to provide further improvements in sustainability and in the quality of life of the beneficiary population. Capacity building of local water agencies would also be appropriate, especially in Malawi and Zambia.

Since the equipment and structure to rehabilitate wells is in place, the cost effectiveness of continuing the well rehabilitation would be greatly improved from the emergency program. This would also assist in drought recovery in many areas, as water deficits caused by the drought are still causing water shortages, with all their attendant problems, in many areas.

Also, since problems of water availability and quality are not limited to the drought, enhanced sustainability is desirable. This could be obtained by organizing communities and training them in pump maintenance and cost recovery.

Follow-on activities, using and enhancing the village structures formed for water point maintenance, could build on health benefits resulting from the relief program by providing training in prevention and control of diarrheal diseases, improved methods of transporting and storing water, environmental hygiene, and other health topics.

These recommendations fall under the "technical" category and represent "ideal" solutions. Of course, given Missions' sentiments about the regional emergency water program, the liklihood of their adopting such follow-on activities seems small.

VII. LESSONS LEARNED

A. Project Design Implications

- Technical input for water projects must be included in relief programs from the beginning of the design process to the end of the project.

- Staff and equipment levels must be commensurate with the expected outputs or efficiency will be adversely affected.

- Health benefits to the beneficiaries cannot be expected unless the water provided is potable. Water cannot be assumed to be potable unless construction standards, including environmental hygiene, are defined and followed. That water quality is acceptable cannot be determined except by analysis.

- Construction of new water points can provide emergency water supplies. Such construction, if intended as emergency relief, should be designed and managed as such.

- Redefinition of an emergency relief project for funding purposes as a combined relief/development effort will only confuse the emergency purpose of the activity, and should be avoided unless the parts can be administered under the same, emergency stipulations.

B. Broad Action Implications

- Timing is crucial in emergency relief response. Delays in funding and implementation can have a disproportionate effect on the rapidity of the response.

- Mission commitment is important to the effective implementation of a program, and oversight responsibility by the Mission needs to be clearly stated.